

What Is Claimed Is:

5           1.    A kit for spine joint replacement comprising:  
              an artificial disc; and  
              a prosthesis for the replacement of at least a  
portion of the bone of a facet located on a mammalian  
vertebra, comprising:

10               a surface that articulates with another facet  
surface; and

              a fixation portion that is implanted into an  
interior bone space of said vertebra,

              said surface being connected to said fixation  
portion;

15               wherein said artificial disc and said prosthesis  
cooperate so as to restore the natural biomechanics of  
a spinal motion segment.

20           2.    The kit of claim 1 wherein said fixation  
portion is a post that is adapted to be fitted into the  
interior bone space of a pedicle.

3. The kit of claim 2 wherein said post is porous coated to allow for bone ingrowth.

5 4. The kit of claim 3 wherein said porous coating includes osteoconductive or osteoinductive substances.

10 5. The kit of claim 1 wherein said fixation portion is a fin that is adapted to be fitted into the interior bone space of the posterior arch.

6. The kit of claim 5 wherein said fin is porous coated to allow for bone ingrowth.

15 7. The kit of claim 6 wherein said porous coating includes osteoconductive or osteoinductive substances.

20 8. The kit of claim 1 wherein said surface that articulates is comprised of one of a group consisting of a polymeric bearing material attached to a metal substrate, a ceramic bearing material, and a metal bearing material.

9. A kit for spine joint replacement comprising:  
an artificial disc; and

5 a prosthesis for the replacement of at least a  
portion of the bone of a facet located on a mammalian  
vertebra, comprising:

a surface that articulates with another  
facet;

10 a bone contacting surface that contacts one  
of an exterior surface or a resected surface of said  
vertebra, said surface that articulates being connected  
to said bone contacting surface; and

a fixation element that attaches said bone  
contacting surface to said vertebra;

15 and wherein said prosthesis is configured so  
that no portion of said prosthesis contacts the  
posterior arch of said vertebra;

20 and wherein said artificial disc and said  
prosthesis cooperate so as to restore the natural  
biomechanics of a spinal motion segment.

10. The kit of claim 9 wherein said fixation  
element is a screw.

11. The kit of claim 9 wherein said flange has a bone side adapted to contact one of said exterior surface or said resected surface of said vertebra, wherein said bone side is porous coated to allow for bone ingrowth.

12. The kit of claim 9 wherein said surface that articulates is comprised of one of a group consisting of a polymeric bearing material attached to a metal substrate, a ceramic bearing material, and a metal bearing material.

13. A kit for spine joint replacement comprising:  
an artificial disc; and

a prosthesis for the replacement of at least a portion of the bones of opposed and articulating facets located on a mammalian vertebra, where said facets are diseased or traumatized, comprising:

an inferior component adapted to be attached to a first vertebra and having a first fixation portion adapted to be implanted into a first interior bone

space and a first articulation portion connected to  
said first fixation portion;

5 a superior component adapted to be attached  
to a second vertebra and having a second fixation  
portion adapted to be implanted into a second interior  
bone space and second articulation portion connected to  
said second fixation portion;

where the first vertebra is adjacent and  
superior to the second vertebra;

10 and wherein said artificial disc and said  
prosthesis cooperate so as to restore the natural  
biomechanics of a spinal motion segment.

14. A kit for spine joint replacement  
15 comprising:

an artificial disc; and

a prosthesis for the replacement of at least a  
portion of the bones of opposed and articulating facets  
located on a mammalian vertebra, comprising:

20 an inferior component adapted to be attached  
to a first vertebra ; and

a superior component adapted to be attached  
to a second vertebra;

where the first vertebra is adjacent and superior to the second vertebra; and

where one of said inferior and superior components includes:

5 a flange that connects to one of an exterior surface or a resected surface of said vertebra; and

a fixation element that attaches said flange to said vertebra;

10 and further wherein of said prosthesis is configured so that no portion of said prosthesis contacts the posterior arch of said vertebra;

and wherein said artificial disc and said prosthesis cooperate so as to restore the natural biomechanics of a spinal motion segment.

15 15. A method for replacing a spine joint, comprising the steps of:

20 replacing an intervertebral disc with an artificial disc;

resecting at least a portion of the bone of a facet;

attaching a prosthetic facet to the remaining bone of said vertebra such that no portion of the prosthetic facet contacts the posterior arch of said vertebra;

where said prosthetic facet is adapted to articulate with another facet;

with the artificial disc and the prosthetic facet cooperating so as to restore the natural biomechanics of a spinal motion segment.

16. A method for replacing a spine joint, comprising the steps of:

replacing an intervertebral disc with an artificial disc;

resecting at least a portion of the bone of a first facet on a first vertebra;

attaching a first prosthetic facet to the remaining bone of said first vertebra such that no portion of said prosthetic facet contacts the posterior arch of said vertebra;

resecting at least a portion of the bone of a second facet on a second vertebra; and

attaching a second prosthetic facet to the remaining bone of said second vertebra such that no

portion of said prosthetic facet contacts the posterior arch of said vertebra;

where said first prosthetic facet is adapted to articulate with said second prosthetic facet;

5 with the artificial disc and the prosthetic facet cooperating so as to restore the natural biomechanics of a spinal motion segment.

17. A kit for spine joint replacement,  
10 comprising:

an artificial disc; and

a prosthesis for the replacement of at least two facets located on a mammalian vertebra, comprising:

15 at least one bone contacting surface that is adapted to be secured to a surface of the vertebra; and

at least two bearing surfaces for articulating with other facets, said at least two bearing surfaces being connected to said at least one bone contacting surface;

20 and wherein no portion of said prosthesis is supported by the lamina of the vertebra;



and wherein said artificial disc and said prosthesis cooperate so as to restore the natural biomechanics of a spinal motion segment.

5           18. The kit of claim 17 further comprising fixation elements for securing said at least one bone contacting surface to the vertebra.

10           19. The kit of claim 18 wherein said fixation elements are screws.

15           20. The kit of claim 17 wherein said at least bone contacting surface is porous coated to allow for bone ingrowth.

          21. The kit of claim 20 wherein said porous coating includes at least one from a group comprising osteoinductive and osteoconductive substances.

20           22. The kit of claim 17 wherein said bearing surfaces are formed from a material selected from the group consisting of a ceramic, a metal and a polymer.

23. The kit of claim 17 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace a pair of inferior facets.

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24. The kit of claim 17 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace a pair of superior facets.

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25. The kit of claim 17 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace an inferior facet and a superior facet.

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26. The kit of claim 17 wherein said prosthesis is configured so that said at least two bearing surfaces are adapted to replace a pair of inferior facets and a pair of superior facets.

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27. A method for replacing a spine joint, comprising the steps of:

replacing an intervertebral disc with an artificial disc;

resecting a pair of facets on the vertebra; and

attaching a prosthesis to the vertebra so that a pair of bearing surfaces on the prosthesis are positioned in place of the resected facets, wherein the prosthesis is configured so that no portion of said prosthesis is supported by the lamina of the vertebra;

with the artificial disc and the prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

28. A method for replacing a spine joint, comprising the steps of:

replacing an intervertebral disc with an artificial disc;

resecting at least a bony portion of the inferior facets of a superior vertebra;

attaching a first prosthesis that replaces said inferior facets of said superior vertebra;

resecting at least a bony portion of the superior facets of an inferior vertebra; and

attaching a second prosthesis that replaces said superior facets of said inferior vertebra;

wherein no portion of said first prosthesis is supported by the lamina of said superior vertebra, and further wherein no portion of said second prosthesis is supported by the lamina of said inferior vertebra;

with the artificial disc and the first prosthesis and the second prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

29. A method for replacing a spine joint, comprising the steps of:

replacing an intervertebral disc with an artificial disc;

resecting at least a bony portion of the inferior facets of a most superior vertebra;

attaching a first prosthesis that replaces said inferior facets of said most superior vertebra;

resecting at least a bony portion of the superior facets of a most inferior vertebra;

attaching a second prosthesis that replaces said superior facets of said most inferior vertebra;

resecting at least a bony portion of all of the facets of at least one intermediate vertebra located between said most superior vertebra and said most inferior vertebra;

5 wherein, for each of said at least one intermediate vertebra, a prosthesis is attached that replaces all facets of said intermediate vertebra;

with the artificial disc and the prostheses cooperating so as to restore the natural biomechanics of a spinal motion segment.

30. A spinal implant kit comprising:

an artificial disc; and

one facet prosthesis adapted to replace two superior facets;

one facet prosthesis adapted to replace two inferior facets; and

one facet prosthesis adapted to replace two superior facets and two inferior facets;

20 with the artificial disc and the prostheses cooperating so as to restore the natural biomechanics of a spinal motion segment.

31. A kit for spine joint replacement comprising:  
an artificial disc; and  
a prosthesis for the replacement of a pair of  
spinal facets, said prosthesis comprising:

5 a first vertical member having a first end  
and a second end, said first end being adapted for  
disposition against, and attachment to, a first pedicle  
of a vertebra, and said second end comprising a bearing  
surface for engagement with a facet of an adjacent  
10 vertebra;

a second vertical member having a first end  
and a second end, said first end being adapted for  
disposition against, and attachment to, the other  
pedicle of the vertebra, said second end comprising a  
15 bearing surface with a facet of an adjacent vertebra;  
and

a bridge connecting said second end of said first  
vertical member to said second end of said second  
vertical member;

20 with the artificial disc and the prosthesis  
cooperating so as to restore the natural biomechanics  
of a spinal motion segment.

32. The kit of claim 31 wherein said first  
vertical member, said second vertical member and said  
bridge are formed so that said prosthesis is displaced  
from the lamina of the vertebra when said first end of  
said first vertical member is disposed against, and  
attached to, the first pedicle of a vertebra and said  
first end of said second vertical member is disposed  
against, and attached to, the other pedicle of the  
vertebra.

33. A spinal implant kit comprising:  
an artificial disc; and  
a superior facet prosthesis adapted to replace two  
superior facets;  
an inferior facet prosthesis adapted to replace  
two inferior facets;  
wherein no portion of said superior facet  
prosthesis is supported by a lamina of a vertebra; and  
wherein no portion of said inferior facet  
prosthesis is supported by a lamina of a vertebra;

with the artificial disc and the prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

5           34. A kit for spine joint replacement comprising:  
an artificial disc; and  
a prosthesis for the replacement of a pair of  
spinal facets, said prosthesis comprising:

10               a first vertical member having a first end  
and a second end, said first end being adapted for  
disposition against, and attachment to, a first pedicle  
of a vertebra, and said second end comprising a bearing  
surface for engagement with a facet of an adjacent  
vertebra;

15               a second vertical member having a first end  
and a second end, said first end being adapted for  
disposition against, and attachment to, the other  
pedicle of the vertebra, said second end comprising a  
bearing surface with a facet of an adjacent vertebra;  
20           and

              a bridge connecting said first vertical  
member to said second vertical member;



wherein said first vertical member, said  
second vertical member and said bridge are formed so  
that said prosthesis is displaced from the lamina of  
the vertebra when said first end of said first vertical  
member is disposed against, and attached to, the first  
pedicle of a vertebra and said first end of said second  
vertical member is disposed against, and attached to,  
the other pedicle of the vertebra;

with the artificial disc and the prosthesis  
cooperating so as to restore the natural biomechanics  
of a spinal motion segment.

35. A kit for spine joint replacement comprising:  
an artificial disc; and

a prosthesis for the replacement of a posterior  
element of a natural vertebra, wherein the natural  
vertebra comprises a natural vertebral body, a pair of  
natural pedicles extending from the natural vertebral  
body, a natural lamina extending from the two natural  
pedicles, a pair of natural superior facets extending  
from the two natural pedicles and the natural lamina, a  
pair of natural inferior facets extending from the  
natural lamina, a natural spinous process extending

from the natural lamina, and a pair of natural transverse processes extending from the two natural pedicles, said prosthesis comprising:

a pair of prosthetic mounts;

5 a prosthetic lamina extending from said two prosthetic mounts;

a pair of prosthetic superior facets extending from said two prosthetic mounts and said prosthetic lamina;

10 a pair of prosthetic inferior facets extending from said prosthetic lamina;

a prosthetic spinous process extending from said prosthetic lamina; and

15 a pair of prosthetic transverse processes extending from said two prosthetic mounts;

with the artificial disc and the prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

20 36. The kit of claim 35 wherein at least one of said prosthetic spinous process and said two prosthetic transverse processes includes at least one opening for attaching soft tissue to said prosthesis.

37. The kit of claim 35 wherein said two  
prosthetic mounts comprise openings for attaching said  
prosthesis to the natural vertebra.

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38. A kit for spine joint replacement comprising:  
an artificial disc; and

a prosthesis for the replacement of a posterior  
element of a natural vertebra, wherein the natural  
vertebra comprises a natural vertebral body, a pair of  
natural pedicles extending from the natural vertebral  
body, a natural lamina extending from the two natural  
pedicles, a pair of natural superior facets extending  
from the two natural pedicles and the natural lamina, a  
pair of natural inferior facets extending from the  
natural lamina, a natural spinous process extending  
from the natural lamina, and a pair of natural  
transverse processes extending from the two natural  
pedicles, said prosthesis comprising:

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a pair of prosthetic mounts;

a prosthetic lamina extending from said two  
prosthetic mounts;

a pair of prosthetic superior facets  
extending from said two prosthetic mounts and said  
prosthetic lamina;

a pair of prosthetic inferior facets  
extending from said prosthetic lamina; and

a prosthetic spinous process extending from  
said prosthetic lamina;

with the artificial disc and the prosthesis  
cooperating so as to restore the natural biomechanics  
of a spinal motion segment.

39. The kit of claim 38 wherein said prosthetic  
spinous process includes at least one opening for  
attaching soft tissue to said prosthesis.

40. The kit of claim 38 wherein said two  
prosthetic mounts comprise openings for attaching said  
prosthesis to the natural vertebra.

41. A kit for spine joint replacement comprising:  
an artificial disc; and  
a prosthesis for the replacement of a posterior  
element of a natural vertebra, wherein the natural

vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural transverse processes extending from the two natural pedicles, said prosthesis comprising:

a pair of prosthetic mounts;

a prosthetic lamina extending from said two prosthetic mounts;

a pair of prosthetic superior facets extending from said two prosthetic mounts and said prosthetic lamina;

a pair of prosthetic inferior facets extending from said prosthetic lamina; and

a pair of prosthetic transverse processes extending from said two prosthetic mounts;

with the artificial disc and the prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

42. The kit of claim 41 wherein at least one of said two prosthetic transverse processes includes at least one opening for attaching soft tissue to said prosthesis.

43. The kit of claim 41 wherein said two prosthetic mounts comprise openings for attaching said prosthesis to the natural vertebra.

44. A kit for spine joint replacement comprising:  
an artificial disc; and

a prosthesis for the replacement of a posterior element of a natural vertebra, wherein the natural vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural

transverse processes extending from the two natural  
pedicles, said prosthesis comprising:

a pair of prosthetic mounts;

a prosthetic lamina extending from said two  
prosthetic mounts;

a pair of prosthetic superior facets  
extending from said two prosthetic mounts and said  
prosthetic lamina; and

a pair of prosthetic inferior facets  
extending from said prosthetic lamina;

with the artificial disc and the prosthesis  
cooperating so as to restore the natural biomechanics  
of a spinal motion segment.

45. The kit of claim 44 wherein said two  
prosthetic mounts comprise openings for attaching said  
prosthesis to the natural vertebra.

46. A kit for spine joint replacement comprising:  
an artificial disc; and

a prosthesis for the replacement of a posterior  
element of a natural vertebra, wherein the natural  
vertebra comprises a natural vertebral body, a pair of

natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural transverse processes extending from the two natural pedicles, said prosthesis comprising:

a pair of prosthetic pedicles;

a prosthetic lamina extending from said two prosthetic pedicles;

a pair of prosthetic superior facets extending from said two prosthetic pedicles and said prosthetic lamina;

a pair of prosthetic inferior facets extending from said prosthetic lamina;

a prosthetic spinous process extending from said prosthetic lamina; and

a pair of prosthetic transverse processes extending from said two prosthetic pedicles;



with the artificial disc and the prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

5           47. The kit of claim 46 wherein at least one of said prosthetic spinous process and said two prosthetic transverse processes includes at least one opening for attaching soft tissue to said prosthesis.

10           48. The kit of claim 46 wherein said two prosthetic pedicles comprise openings for attaching said prosthesis to the natural vertebra.

15           49. A kit for spine joint replacement comprising:  
an artificial disc; and

20           a prosthesis for the replacement of a posterior element of a natural vertebra, wherein the natural vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the

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51. The kit of claim 49 wherein said two prosthetic pedicles comprise openings for attaching said prosthesis to the natural vertebra.

5 52. A kit for spine joint replacement comprising:  
an artificial disc; and  
a prosthesis for the replacement of a posterior  
element of a natural vertebra, wherein the natural  
vertebra comprises a natural vertebral body, a pair of  
10 natural pedicles extending from the natural vertebral  
body, a natural lamina extending from the two natural  
pedicles, a pair of natural superior facets extending  
from the two natural pedicles and the natural lamina, a  
15 pair of natural inferior facets extending from the  
natural lamina, a natural spinous process extending  
from the natural lamina, and a pair of natural  
transverse processes extending from the two natural  
pedicles, said prosthesis comprising:  
a pair of prosthetic pedicles;  
20 a prosthetic lamina extending from said two  
prosthetic pedicles;

a pair of prosthetic superior facets  
extending from said two prosthetic pedicles and said  
prosthetic lamina;

a pair of prosthetic inferior facets  
extending from said prosthetic lamina; and

a pair of prosthetic transverse processes  
extending from said two prosthetic pedicles;

with the artificial disc and the prosthesis  
cooperating so as to restore the natural biomechanics  
of a spinal motion segment.

53. The kit of claim 52 wherein at least one of  
said two prosthetic transverse processes includes at  
least one opening for attaching soft tissue to said  
prosthesis.

54. The kit of claim 52 wherein said two  
prosthetic pedicles comprise openings for attaching  
said prosthesis to the natural vertebra.

55. A kit for spine joint replacement comprising:  
an artificial disc; and

5 a prosthesis for the replacement of a posterior  
element of a natural vertebra, wherein the natural  
vertebra comprises a natural vertebral body, a pair of  
natural pedicles extending from the natural vertebral  
body, a natural lamina extending from the two natural  
pedicles, a pair of natural superior facets extending  
from the two natural pedicles and the natural lamina, a  
pair of natural inferior facets extending from the  
natural lamina, a natural spinous process extending  
10 from the natural lamina, and a pair of natural  
transverse processes extending from the two natural  
pedicles, said prosthesis comprising:

a pair of prosthetic pedicles;

5 a prosthetic lamina extending from said two  
prosthetic pedicles;

a pair of prosthetic superior facets  
extending from said two prosthetic pedicles and said  
prosthetic lamina; and

20 a pair of prosthetic inferior facets  
extending from said prosthetic lamina;

with the artificial disc and the prosthesis  
cooperating so as to restore the natural biomechanics  
of a spinal motion segment.

56. The kit of claim 55 wherein said two prosthetic pedicles comprise openings for attaching said prosthesis to the natural vertebra.

57. A method for replacing a spine joint, wherein the natural vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural transverse processes extending from the two natural pedicles, said method comprising the steps of:

replacing an intervertebral disc with an artificial disc;

making a resection at the most dorsal aspect the two natural pedicles; and

attaching a prosthesis to the resected vertebra, said prosthesis comprising a pair of prosthetic mounts, a prosthetic lamina extending from said two prosthetic

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61. A method for replacing a spine joint, wherein the natural vertebra comprises a natural vertebral body, a pair of natural pedicles extending from the natural vertebral body, a natural lamina extending from the two natural pedicles, a pair of natural superior facets extending from the two natural pedicles and the natural lamina, a pair of natural inferior facets extending from the natural lamina, a natural spinous process extending from the natural lamina, and a pair of natural transverse processes extending from the natural pedicles, said method comprising the steps of:

replacing an intervertebral disc with an artificial disc;

making a resection at the junction of the natural vertebral body and the two natural pedicles; and

attaching a prosthesis to the resected vertebra, said prosthesis comprising a pair of prosthetic pedicles, a prosthetic lamina extending from said prosthetic pedicles, a pair of prosthetic superior facets extending from said two prosthetic pedicles and said prosthetic lamina, and a pair of prosthetic inferior facets extending from said prosthetic lamina;



with the artificial disc and the prosthesis cooperating so as to restore the natural biomechanics of a spinal motion segment.

5           62. A method according to claim 61 wherein said prosthesis further comprises a prosthetic spinous process extending from said prosthetic lamina.

10           63. A method according to claim 61 wherein said prosthesis further comprises a pair of prosthetic transverse processes extending from said two prosthetic pedicles.

15           64. A method according to claim 61 wherein said prosthesis further comprises a prosthetic spinous process extending from said prosthetic lamina and two prosthetic transverse processes extending from said two prosthetic pedicles and said prosthetic lamina.

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